

Actionable Delta Science: 2015-2016 Draft List of High-Impact Science Actions

Staff Recommendation: DPIIC ENDORSEMENT

*Reach a consensus-based endorsement of the **High-Impact Science Actions for Near-Term Implementation** as identified by the Delta Agency Science Workgroup. Endorsement, consistent with the DPIIC's [Guiding Principles](#), directs the Workgroup to work with additional agencies and Delta stakeholders to secure funding for and initiate implementation of actions on this list.*

SUMMARY

Last November, the Delta Plan Interagency Implementation Committee (DPIIC) accepted an Interim Science Action Agenda (ISAA) as a reference for guiding regional science activities in support of policy and management decisions in the Delta.

Upon acceptance of the ISAA, DPIIC members agreed to commit science and policy managers to:

- 1) Secure a cross-agency understanding of priority science needs in the Delta, and
- 2) Identify a short list of high-impact, multi-benefit science actions for immediate implementation in 2015-2016 and report back to the DPIIC at the next meeting.

Outcome: Through two facilitated workgroup meetings using the ISAA as the foundation, a draft list was developed that recommends a suite of high-impact science actions that will allow for joint implementation efforts among various agencies and members of the Delta science community.

Four priority areas were identified:

Assessing drought-related effects on the Delta

Effectiveness and implications of habitat restoration actions

Science support for management of estuarine and migratory species

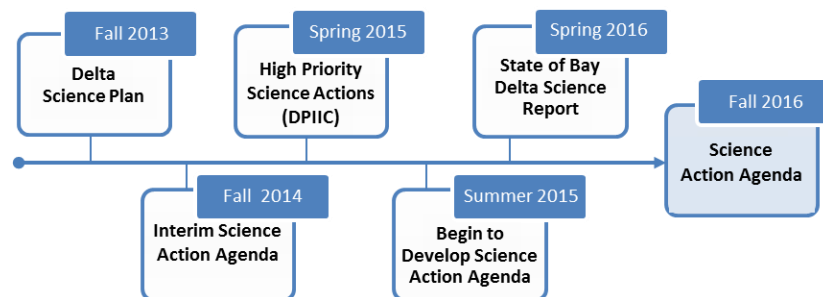
Science supporting flood risk reduction and the economies of Delta communities

Corresponding science actions were then identified for each priority area. These selections were based on the following criteria: Are they *actionable*? Do they have *cross-agency relevance*? Are they feasible for *near-term implementation*?

BACKGROUND

In December 2013, the Delta Science Program released the Delta Science Plan, a document developed to support the implementation of the Delta Plan. The Delta Science Plan provides principles and approaches to conduct science in a transparent and collaborative way to promote science that is credible, legitimate, and relevant. The framework for science cooperation across authorities in the Delta set forth by this plan is unprecedented in its goals and direction. Unique to the Delta Science Plan is the Delta Science Strategy, an overarching strategy for collaborative science to address the need for more integrated scientific efforts among agencies and programs to facilitate efficient uses of resources and improve communication of science.

To initiate the implementation of the Delta Science Plan, an Interim Science Action Agenda (ISAA) was developed to form the basis of the full Science Action



Agenda, a key component to the Delta Science Strategy. The ISAA itself is collaborative in nature, bringing together the priorities of key Delta players into one document. Development of the ISAA included synthesizing priority science actions and questions from existing reports and initiatives, in-depth interviews with 22 Delta agencies, and a public workshop for key stakeholders and other agency representatives to contribute to the initial draft. A formal public comment period was conducted and responses were incorporated in the final draft, which was accepted by the Delta Stewardship Council in September 2014.

In support of the “One Delta, One Science” vision, the Delta Plan Interagency Implementation Committee accepted the ISAA in November 2014 as foundational for guiding regional science activities in support of policy and management decisions in the Delta. DPIIC members expressed a collective interest in taking the next steps toward prioritizing and implementing this science agenda. To achieve this goal, the Committee requested a representative group of science and policy managers work to secure a cross-agency understanding of priority science needs in the Delta and to identify a short list of high-impact science activities for near-term implementation based on the ISAA.

Developing the Draft List

In response to the DPIIC request, Delta Stewardship Council (Council) staff helped to establish a Delta Agency Science Workgroup (Workgroup) composed of key policy and science managers selected by individual DPIIC members to act on behalf of their respective agencies. The Workgroup brought together leadership from 14 of the 17 DPIIC agencies to produce a shared set of priorities having joint funding and collaborative research opportunities. (*See Appendix A*)

Developing the draft list of high impact science actions involved two facilitated Workgroup meetings and a public briefing. This interagency effort challenged each representative to look beyond their individual agency needs and strive to enhance the current state of scientific knowledge of the Delta. In crafting the draft list of high-impact science actions, Workgroup members focused on activities that would provide best available science to managers and policymakers, and further the State and federal commitment to achieving the coequal goals for the Delta.

To best manage the Workgroup discussion and honor the accelerated timeframe for producing the requested work product, Delta Science Program staff pared down a master list of over 320 proposed high-impact science actions from the ISAA with additional science actions identified in the IEP Management Team recommendations for the 2015 work plan. (See Appendix B)

This master list of individual science actions was refined using three criteria based on the DPIIC request:

- **Actionable**
 - a. Answers a specific question or management need
 - b. Is not currently funded or in need of additional funding to initiate
- **Cross-agency Relevance**
 - a. Relevant to several initiatives including the Delta Plan, Delta Science Plan, and California Water Action Plan, along with supporting federal investments in the Bay-Delta region
 - b. Requires joint implementation by multiple agencies/organizations
 - c. Serves to fill gaps in science knowledge important to multiple agencies
 - d. Provides opportunities to collaboratively advance scientific understanding and build science capacity to address decision-makers' needs
 - e. Provides multiple benefits to the Delta-wide system
- **Near-term**
 - a. Feasible to implement or initiate implementation within the next two years, 2015-2016

Using the above criteria, the master list was refined to 118 individual science actions. These remaining science actions were organized into 16 topics based on similar scope or issue, creating the initial working document for the Workgroup to use as the basis for discussion and further refinement. The individual science actions that were filtered and the resulting list of topics can be found in Appendix B and C, respectively.

Workgroup Meeting 1: February 18, 2015

Council staff presented the Workgroup with the interim list of 16 topics and secured Workgroup consensus to use this list as the framework to support identification of high-impact science actions. After discussing high-impact Delta issues, four priority issues emerged as critical for

near-term focus in the Delta. These are listed below with a brief explanation of their significance and relevance to key policy initiatives.

- **Assessing drought-related effects on the Delta:** There is regional consensus regarding the urgency of understanding the full-range of drought effects on the Delta system (California Water Action Plan Action 5, Delta Plan Chapters 3 and 4, Delta Science Plan sections 4.2 and 4.5).
- **Effectiveness and implications of habitat restoration actions:** In light of ongoing and proposed landscape-scale restoration projects to begin in the near-term, there is a need for pre-restoration data and synthesis of the efficacy of past projects to guide current restoration activities (California Water Action Plan Actions 3 and 4, Delta Plan Chapter 4, Delta Science Plan sections 3.2 and 4.2).
- **Science support for management of estuarine and migratory species:** This issue encompasses several elements identified as priority topics including native fish distribution, food web dynamics, and flow effects on native species. Projects addressing this issue will identify key informational needs for endangered and estuarine species management (California Water Action Plan Actions 3 and 4, Delta Plan Chapter 4, Delta Science Plan section 4.4).
- **Science supporting flood risk reduction and the economies of Delta communities:** This issue incorporates many aspects of Delta as a Place including flood protection, invasive aquatic vegetation, and the Delta economy. Increasing our understanding of these topics is a critical step in protecting the unique cultural, natural, recreational, resource, and agricultural values of the Delta (California Water Action Plan Action 8, Delta Plan Chapter 5 and 7).

Potential science actions were then identified to address each issue. During the discussion, it became apparent that the actions generally fell into two categories:

- 1) Rapid-response science actions that address immediate science needs in the Delta and are feasible to implement in the upcoming year with near-term results, and
- 2) Longer-term science needs having a broader scope, appropriate for near-term initiation in the form of a proposal solicitation or Delta Science Fellows solicitation.

The result was a suite of science actions with a range of starting points that could be addressed by multiple implementation mechanisms, described in more detail below. Many of the science actions identified were based on individual science actions within the ISAA, while some were related but newly identified projects addressing immediate needs in the Delta. The rapid-response actions fulfill the DPIIC request for providing high-impact actions for near-term implementation. The DPIIC request also initiated an opportunity for Workgroup members to focus attentions on longer-term research related to the four priority issues. Long-term research is a crucial element in contributing to the understanding of the broader impacts of management

decisions and provides information integral for adaptive management and formation of future scenarios.

Implementation Mechanism	What it Does
Directed Actions (DA)	Provides funding for more focused studies where both the scope and research team have been identified. The administration process is completed in less than 2 months, the resulting grant or contract covering a variable time period ranging from one month to 3 years.
Request for Proposals (RFP)	A funding process where the scope of research has been identified, but the project team is still unidentified. The administrative process takes approximately 6 months and the resultant grant or contract covers 1-3 years.
Proposal Solicitation	Provides funding for broader concepts where a scientific need has been identified but no specific study or project team has been chosen. The solicitation process takes approximately 6 months to complete and the respective research grants are for a 2-4 year study.
Delta Science Fellows Program	This program brings young scientists and Delta agency scientists together to work collaboratively on data synthesis and research projects of importance to the management needs of the Delta. The Delta Science Fellows Program also trains young scientists to work in multidisciplinary, field-oriented research and provides opportunities for agencies to recruit talented scientists. The solicitation process, completed in approximately 6 months, results in the pairing of a post-doctoral researcher or Ph.D. candidate with an academic mentor and an agency/NGO organization (community mentor).

Workgroup Meeting 2: March 12, 2015

During the second facilitated meeting, science actions corresponding to the four priority areas were further developed, refined, and reorganized based on their appropriate implementation time frame and Workgroup feedback. Workgroup members agreed that further direction from the DPIIC, additional discussions, and engagement of stakeholders regarding initiation of implementation may alter the anticipated funding mechanisms and/or specific components of some actions.

The meeting concluded with a discussion regarding the challenges of managing multi-agency funding and joint implementation of the high-impact science actions list. The Workgroup

recognized that the tasks of identifying lead agencies and increasing stakeholder involvement still remained. In response, they expressed a shared interest in forming a sub-group to explore how to navigate these funding and implementation challenges. The integrated collaborative work done by the Interagency Ecological Program (IEP) and Collaborative Adaptive Management Team (CAMT) was raised as an example for approaching such challenges. Initiating communication with key staff of those efforts was noted as an important next step to deliver on these science actions.

Public Briefing of Draft List: April 8, 2015

A public briefing was conducted to present the refined draft list of high-impact science actions to members of the scientific community, Delta stakeholders, and the general public. A total of 18 people participated in the briefing, representing 9 organizations and agencies. During the two-hour briefing, initial efforts and methods of the list development were described with an hour dedicated for commentary. Public recommendations generally included feedback emphasizing particular elements of the list including developing monitoring tools, improving data accessibility, and collecting pre-restoration data. There was also interest in participating in developing the proposal solicitation topics, sponsoring science fellows, and comments regarding the need for more public involvement. The latter request will be reflected throughout the planning process of the science actions.

Final Draft List of High-Impact Science Actions

Tables 1 and 2, below, present detailed descriptions of the science actions included in the draft list as well as their significance and management implications. Table 1 represents the science actions that are more specific and detailed and therefore can be addressed relatively quickly, with a potential to provide results within the upcoming year. The actions in Table 2 are broader in scope and more appropriate to be addressed through a proposal solicitation complemented by a Delta Science Fellows call for applications.

NEXT STEPS

DPIIC Endorsement

Staff recommends DPIIC endorsement of the High-Impact Science Actions (Tables 1 & 2) as identified by the Delta Agency Science Workgroup. For DPIIC purposes, endorsement is a consensus-based action consistent with the DPIIC Guiding Principles.

Initiate Implementation

Pending endorsement, Delta Stewardship Council staff will continue working with the Delta Agency Science Workgroup, incorporating increased stakeholder participation, to develop detailed plans for implementation of the actions on the list, which will include identification of a lead agency, key personnel, and resources needed for each action. Endorsement is intended to empower staff to move forward with identifying and securing funding for these actions, and

promptly initiate implementation efforts where feasible. The Delta Agency Science Workgroup may form subgroups of appropriate agencies and stakeholders to manage implementation and coordination of specific actions.

In order to maintain transparency between the twice-yearly DPIIC meetings, implementation progress of the endorsed high priority science actions will be reported at meetings of the Delta Stewardship Council.

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Table 1. High Impact Science Actions That May Be Addressed by Rapid-Response Implementation

Science Action		Product or Outcome of Science Action	Significance and Management Implications of Science Action
Topic 1. Assessing drought-related effects on the Delta			
A	Conduct a technical review of current reports concerning the drought to identify what is known about effects of the drought as well as to determine gaps in knowledge and topics not covered in past synthesis efforts. Using results from the review conduct a “lessons learned” workshop and create a set of metrics to monitor key indicators of drought impacts.	Insight on effects of the drought, identification of future research needs and information to create a set of metrics to monitor key drought indicators to aid future management efforts.	Although several topic and species-specific drought synthesis reports exist, none provide a broad assessment of drought impacts and responses. Understanding the implications of the full range of drought effects is important to support development of management actions that minimize the impacts of current and future droughts and related management to all interests.
B	Evaluate tools supporting real-time operations, monitoring, reporting, data management, and accessibility of data.	A report on real-time management tools and technology to improve salinity and Delta outflow measurements for informing management decisions.	Nimble drought management requires rapid delivery of useful information regarding the current state of the system. Although a system of real-time monitoring information is available, it can be improved and enhanced so that more timely information may be used to guide decision making.
Topic 2. Effectiveness and implications of habitat restoration and actions			
C	Synthesize established knowledge about designing effective habitat restoration projects in the Delta.	A report outlining lessons learned from past restoration studies and efforts, providing a list of specific knowledge gaps and design principles for habitat restoration. This information can be used to adaptively guide the design of habitat restoration monitoring efforts and provide recommendations for effective adaptive management.	Previous Delta restoration projects must be evaluated and the information gained used to adaptively guide the design of habitat restoration efforts and provide recommendations for effective adaptive management. Such processes are critical to ensure projects are planned and implemented in an integrated, consistent and systematic way to improve native species habitat.
D	Enhance current and promote additional monitoring efforts in the Delta and Suisun marsh to gather pre-restoration data.	Plans for and implementation of baseline monitoring needed for pre/post habitat restoration analyses.	There is a need to evaluate habitat restoration effectiveness and document lessons learned to support adaptive management and increase the likelihood of achieving restoration goals.
E	Develop the landscape vision and decision support framework for the Northeast Delta pilot effort.	A vision and decision support framework that will offer an adaptive roadmap for management of restoration progress in the Cosumnes-Mokelumne Priority Habitat Restoration Area.	The Landscape Vision and Decision Support Framework aims to make the best available science actionable — implementing advanced analytical tools, scientific knowledge base, and interdisciplinary expert collaboration—for the task of reconnecting land and water for native species recovery and ecosystem resilience.
Topic 3. Science support for management of estuarine and migratory species			
F	Conduct follow-up work to improve collaborative temperature modeling of cold water forecasting for Shasta Dam releases into the Sacramento River.	A synthesis report of current temperature modeling efforts and recommended improvements to better forecast cold water release, followed by implementation of the recommendations.	Current temperature models need improvement to better forecast water releases from Shasta Dam to protect winter-run Chinook salmon. This is especially critical in the face of the current drought affecting storage and cold water temperatures.
G	Peer-review of the Southwest Fisheries Science Center’s winter-run Chinook salmon life-cycle model.	A scientifically robust salmon life-cycle model to inform decisions to adapt water operations and prescribed RPA actions.	The SWFSC model has been identified as the most promising life cycle model to date. This model is already being utilized for a variety of management questions due to the urgent need for the information it provides; thus a peer-review of this tool is needed.
H	Fund research identified by various efforts such as Salmon/Steelhead/Sturgeon Assessment of Indicators by Life Stages (SAIL), the Interagency Ecological Program’s Management, Analysis, and Synthesis Team (MAST), the Collaborative Adaptive Management Team (CAMT), and Delta Regional Monitoring Program (Delta RMP).	Information to fill knowledge gaps identified by respective synthesis efforts for informing management actions intended to protect key species and habitat.	With the current drought and changing environment, both water supply and endangered species in the Delta are in critical condition. These collaborative efforts are specifically designed to identify knowledge gaps and are important tools for providing research recommendations to inform management actions intended to protect key species and habitat.
Topic 4: Science supporting flood risk reduction and the economies of Delta communities			
I	Consolidate the current state of knowledge regarding economic analysis of the potential to reduce flood damage through strategic levee setbacks and expanding wetland and floodplain acreage.	A synthesis report identifying state of knowledge, gaps, research recommendations, and economic impacts of flood management effects on wetland and floodplain projects.	Past economic analyses of levee changes have focused primarily on impacts rather than offsetting benefits. There is a need to synthesize current information and identify knowledge gaps and research recommendations on economic impacts of wetland and floodplain restoration and levee setback management to inform upcoming decision points regarding levee modification and the Delta Levee Investment Strategy.

Table 2. High Impact Science Actions That May Be Addressed by Longer-Term Implementation in the form of a Proposal Solicitation or Delta Science Fellows

Science Action		Example Research Projects	Significance and management implications of science action
Topic 1. Assessing drought-related effects on the Delta			
i.	Investigate effects of drought-induced flow changes on native fish survival and migration patterns.	Effects of temperature changes on juvenile green sturgeon recruitment, effects of flow and increased salinity on population distribution of Chinook salmon during summer months.	Products from this research would provide additional knowledge to inform water management, species needs, and recommendations for emergency response.
ii.	Advance models that assess effects of changes in flow, entrainment, water quality, food-web dynamics, and contaminants on juvenile fish using recent data from drought-related projects.	Investigate potential alternate mechanisms and factors affecting juvenile fish mortality, such as pathogens, in addition to temperature when running juvenile health condition models.	Investigation of potential alternate mechanisms and factors affecting fish are needed to improve monitoring and management efforts.
Topic 2. Effectiveness and implications of habitat restoration actions			
iii.	Understand the effectiveness of wetland habitat restoration of subsided Delta islands on subsidence reversal, carbon sequestration, mercury methylation, flood protection, and levee stability.	Assessment of increased habitat acreage in relation to flood protection and levee integrity.	There is great interest in investing cap and trade funds in Delta wetland restoration to reverse subsidence and sequester carbon. Landscape-scale assessment of the impacts of large-scale wetland restoration on subsided Delta islands has yet to be done. This information is important so that managers and policy makers can understand the effects of large-scale subsidence reversal and wetland habitat restoration.
iv.	Develop decision-support tools to explore alternative Delta habitat restoration designs and potential regional effects of multi-project implementation on water quality, contaminants, flow, and species population dynamics.	Studies focused on projects that if implemented will have synergistic effects on the system; develop models that identify tradeoffs among habitat restoration designs.	Currently, there is a lack of sufficiently integrated decision-support tools. Improved tools for planning, implementing, and evaluating Delta habitat restoration will allow for better, more efficient outcomes that are more likely to meet management objectives.
Topic 3. Science support for management of estuarine and migratory species			
v.	Support new innovations such as real-time tracking devices and adjustments to monitoring and survey designs to aid in determining temporal and spatial distribution of fish at a finer scale than is currently achieved.		Innovative technology supporting fish distribution and abundance are needed to enhance real-time and decision support tools to increase management efficiency and allow rapid response in the face of emergency.
Topic 4: Science supporting flood risk reduction and the economies of Delta communities			
vi.	Economic impact assessment of Invasive Aquatic Vegetation (IAV) on boating, recreation, operations, and management.	Focused assessments of IAV effects on boating, recreation, operations and management	Currently there are no sufficient economic analyses of the impacts of IAV to inform management decisions.

Appendices:

Appendix A: Delta Agency Science Workgroup Participants

Appendix B: Master List of Individual Science Actions

Appendix C: Interim List of 16 High Impact Topics